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ABSTRACT

This study tested the hypothesis that peer tutoring would have a significant, favorable effect on the school achievement, motivation, attitude, and self-concept of unmotivated children, both tutors and tutees. A pilot study and a main study were undertaken, using experimental and control groups. The experimental groups had an orientation session before the start of the project, and tutors had a training session. The program was carried out for 8 months in the pilot study and 3 months in the main study. Informal evidence clearly indicated that the program was enthusiastically accepted by teachers, parents, and students. Analyzing the data on five dependent variables, it was found that tutors and tutees in the experimental group evidenced significant growth on measures of academic achievement, motivation as assessed by the teachers and the students, and, for the tutors, in attitude toward school. The only objectives which were not met were a favorable change in the self-concept of both tutors and tutees and a positive attitude change in tutees, probably due to the short duration of the project. It is suggested that teachers should be provided with training and support for a change to a self-directed instructional program, and a teacher manual is being developed. The instruments used are included in the document. (MBM)

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A Research Report

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PEER TUTORING AS A TECHNIQUE FOR TEACHING THE UNMOTIVATED

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The Problem

Motivation is of particular significance to the classroom teacher as it helps in the selection, direction, integration, determination of magnitude, and development of persistence of a child's steps in learning. Though it is true that the child is the principal agent in his own education and development, it is too often true that many children fail to identify with the goal or purpose and apathetically go through the motions of participating in class activities without any real or lasting learnings. It is at this point in the teaching-learning process that teachers badly need to know, understand, and use motivational procedures that inspire children.

A low level of motivation is considered by many as the number one learning problem for children in the classes of most teachers at all levels in our schools. Yet, this is one area of teaching in which many teachers seem to be inadequately informed and equipped and feel the need for improved techniques or skills (Glaser, et al., 1970). This is, in part, due to the conflicting and impractical concepts and theories on motivation and, in part, due to the fact that the teacher tries to tackle the problem on a group basis.

The behavior of unmotivated children is characterized by a lack of goal-directedness, energy, and emotional response to objects and situations. This means that such children are not guided by self-directing goals in

the selection of activities in their day-to-day school life. The motivated child is enthusiastic and energetic but the behavior of unmotivated children is characterized by lack of speed, intensity, and effort. The process by which an impulse to action is provided and by which the child is encouraged to put forth required energy is often missing.

Unmotivated children also differ in emotional response. That is, when confronted with certain objects or situations, they often do not experience satisfaction or dissatisfaction. They do not express positive or negative emotional response; they are apathetic toward activities; they seldom give verbal expression of pleasure or pain. Over the years, these children have adopted a way of life that does not include perseverance. They do not work harder and longer on any one task than another.

The result is that these children, unlike their motivated classmates, do not achieve established goals and objectives. It may be that some of this variability in the achievement of objectives is due to differences between unmotivated and motivated children in such cognitive and socio-economic factors as: intelligence, aptitude and family background. However, while not denying the significance of such characteristics, it is suggested that affective factors related to motivation may be more important.

To reach the unmotivated child and to help him cultivate a genuine zeal and enthusiasm in the learning process that will produce high achievement and positive attitudes, it is necessary to <u>look at</u> the unmotivated child's environment. A school-going child spends approximately half his waking time in the school environment. An

active search for environmental variables in the school environment can provide etiological factors in the school that might have shaped and maintained unmotivated behavior. Such a search will help in restructuring activities for the unmotivated children in the school in the presence of other extrinsic sources of positive motivation which are sufficiently strong to overcome the amount of inhibition or resistance to activity.

The School Environment

There are a number of characteristics in the school environment which might be related to low motivation among school children. Some such characteristics are:

(a) Group Centered - The physical and social environment in a conventional school caters to the needs of a group and, as such, the student's sense of individual identity may be lost in the impersonal "educational mill," where "he is processed through large lecture classes, tested by objective examinations, and recorded in symbols on computer tape" (Crutchfield, 1965). To motivate each child in the classroom, he should be offered opportunities for learning experiences which are meaningful to him and in which he may become meaningfully engaged. This means providing individualized instruction.

(b) Lack of Child Participation in Goal Setting - In the mass educational process, educational goals and objectives are normally specified by teachers for a group of children and the individual child is usually not given an opportunity to participate in this goal setting and decision making. In truth, he may have in his own mind established a goal for himself quite different from that of the teacher. Such a child is bound to become unmotivated because classroom experiences have

utterly different meanings for him. Therefore, child participation in the goal setting is suggested as another step toward facilitating motivation. Self-involvement will result in greater effort, greater understanding, and greater enjoyment and progress toward goals. Not only should students be encouraged to participate in the establishment of realistic, attainable, and worthy goals, but also in establishing the nature and order of their learning. Thus, to outline a task clearly and understandably would seem to be one of the most important motivational tools because such a step would guide the teacher in the teaching and the learner in his learning.

(c) Absence of Prompt and Specific Feedback - In the conventional school environment, another factor that leads to lack of motivation is absence of prompt feedback. After he responds, the learner is often not provided with immediate and descriptive information concerning the correctness, appropriateness, or adequacy of his response to the task at hand. Too often, in our present school situation, learners do not know about the adequacy of their test responses until days afterward when they find out whether their responses were correct or incorrect. In some cases, learners may never learn about the adequacy of their specific response because they are awarded an overall grade on the total assignment. Also feedback is very useful in redirecting the learner's performance as it identifies areas where he needs further practice and spells out how much of a correction is needed.

(d) Reward Preference - Often no attempt is made in our schools to determine the reward preferences of each unmotivated child in advance of instruction, group discussion, or individual conference. The result

is that some students do not manifest the observed behaviors even after persistent teacher effort. This shows that these students are not being rewarded for desired behaviors with their most preferred type of reinforcement. Therefore, in order to strengthen a child's motivations for learning, it appears imperative to establish the child's preference for reward and then to reward the child in a highly consistent manner keeping the following three principles in mind: (1) liberally reward that behavior which is to be encouraged; (2) occasionally reward a stable behavior pattern in order to maintain it; and (3) avoid rewarding undesirable behaviors (Cartwright and Cartwright, 1969).

The Purpose of the Study

A programmatic investigation in a field situation of the effects of peer tutoring as a technique for recomposing motivations for learning and teaching unmotivated children was the major purpose of the study. It was hypothesized that peer tutoring would favorably affect the expression of selectivity, preference or direction in behavior and the tendency of action, once initiated, to persist until the end or goal was attained. Of course, peer tutoring is not new. It was a widely used technique in the one-room school and has been criticized as a way of "using" children. Recently, it has been used in counseling, in drug abuse and crime abatement programs, and in schools where a high achiever teaches his classmates who are low in achievement (Vriend, 1968).

In the school setting, the technique, it is claimed, helps alleviate the problem of shortage of teachers, teaches students' self-help, offers senior students work responsibility, and a new type of effective job station. Peer tutoring also provides a needed boost for the younger children and is a very real way of involving the older children and

modifying their behavior and attitudes toward their own learning. However, very little research seems to have been undertaken to support these claims.

The Rationale

The rationale behind the use of peer tutoring can be stated in the following two convictions. One is applicable to the tutors: if you want to learn something, try teaching it. It was hypothesized that involvement, work responsibility and role reversal would favorably modify the behavior and attitude of tutors toward their own schooling. The tutors will begin to realize that they cannot misbehave and be responsible teachers at the same time. If carried on over a period of years, peer tutoring offers the possibility of a very real change in the educational climate of a school. The second conviction is applicable to the tutees: As Coleman (1966) has suggested, the most effective teachers of children are often his peers. Or to put it another way, it was hypothesized that many children who fail to learn from teachers (or who have teachers who fail to teach) would succeed in learning from each other. The student who is being helped gets help from a person who, more or less, talks his language and may have the same kind of problem he is encountering.

Peer tutoring also offers opportunities for individualized instruction, prompt feedback, participatory goal setting, and reinforcement. One to one tutorial relationship promises to satisfy a set of human needs. These include the need for: (1) a sense of belonging, (2) a sense of achievement, (3) love and affection, (4) freedom from fear, (5) freedom from excessive feelings of guilt, (6) a share in making decisions, (7) sense of relevance, and (8) personal integration of attitudes, beliefs, and values.

It was postulated that a system of instruction where one child teaches another stimulates children to persevere longer, attempt difficult tasks and have fun while working. Such an interaction promised to be beneficial for both peers and provides a means whereby education, with profit, redesign many learning experiences to motivate children and facilitate learning.

Instruments

The following instruments were used: (1) Teacher Assessment Sheet (Appendix II) and Self-Assessment Sheet (Appendix III) of Positive Terminal Behaviors (Klausmeier, et al., 1969). Each consists of 20 items indicative of behaviors of motivated children; (2) School Sentiment Index (Instructional Objectives Exchange, 1970). Two levels of this instrument were used. The Primary Level (Appendix IV) consisting of 30 items representing five subscales is applicable for grades 2 and 3. The Intermediate Level (Appendix V) consisting of 75 items representing five subscales is applicable for grades 5, 6, 7 and 8. The five dimensions of the school measured by the five subscales are: teacher, learning, school structure, peer and general; (3) Self Appraisal Inventory (Instructional Objectives Exchange, 1970). Again two levels of this inventory were used. The Primary Level (Appendix VI) consists of 40 items and attempts to secure in a straightforward fashion a child's responses to questions which pertain to four aspects of the self-concept. The Primary Level is applicable to grades 2 and 3. The Intermediate Level (Appendix VII) consists of 80 items measuring child's concept in four dimensions of family, peer, scholastic and general and is applicable to grades 5, 6, 7 and 8; (4) A locally developed Mathematics Skill Test. This test consists

of 40 items criterion-referenced to measure the achievement of objectives in set theory to be realized in the project. This was administered to all the subjects irrespective of their grade. It may, however, be stated that the items were not beyond the difficulty level of grade 3; (5) An 8-item Teacher Reaction Questionnaire (Appendix VIII) to secure the reactions of the teachers involved in the program regarding the usefulness of the experience provided in the program; (6) An 8-item Parent Reaction Questionnaire (Appendix IX) to secure the reactions of the parents whose children were involved in the program regarding the usefulness of the experiences provided in the program.

Procedures for the Study

The purpose of the study was to test the hypothesis that peer tutoring would have a significantly favorable effect on the school achievement, motivation, attitude, and self-concept of the unmotivated children - both tutors who taught and the younger group who were taught. Originally, it was planned to field test the idea as a pilot study. As the results of the pilot study were very encouraging, the main study was undertaken in another area school in which a larger sample was available. The procedure for both studies was as follows: at first unmotivated children were identified from Grades 2, 3, 7 and 8 for the pilot study and Grades 2, 3, 5 and 6 for the main study using the Teacher Assessment Sheet of Positive Terminal Behavior (Appendix II) and the Self-Assessment Sheet of Positive Terminal Behaviors (Appendix III). The Teacher Assessment Sheets were completed by the teachers and the Self-Assessment Sheets by children. All those students whose

scores on these assessments were in the lowest 10 percent in their respective grade were identified as unmotivated children. The final sample was selected in consultation with the teachers from this potentially unmotivated group. The children were also administered appropriate levels of the School Sentiment Index (Appendices IV & V) and Self Appraisal Inventory (Appendices VI & VII). The Mathematics Skill Test was also administered to the final sample selected for the study.

The unmotivated children from each grade were randomly divided into two groups. One of these groups from each grade was designated as a control group. This group would study mathematics in their respective classrooms under teacher-directed activities. The other group was designated as the experimental group. The subjects in the experimental group from all the four grades were brought together and each was asked to select one student with whom he would like to work for one hour a day, twice a week. However, participants were told that grade 8 should choose from grade 3 and vice versa and grade 7 from grade 2 and vice versa in the pilot study and grade 6 from grade 3 and vice versa and grade 5 from grade 2 and vice versa in the main study. Participation was on a voluntary basis. Two subjects in the main study expressed their unwillingness to participate and were excluded from participation. In this way, dyadic pairs were set up. There were 6 dyadic pairs and no control subjects in the pilot study and 16 dyadic pairs and 31 control subjects in the main study.

At this stage, a strategy to undertake the project was worked out

in cooperation and consultation with the teachers. The time, day and place for dyadic peer tutoring sessions were decided upon. It was further decided that tutoring be done in the area of mathematics only. An outline of the Grade 2 and Grade 3 mathematics curriculum in the area of set theory was prepared.

Before the actual implementation of the program, one orientation session was conducted for the experimental group. In this session the subjects in the experimental group were told about the purpose of the project. Administrative details like the day, place and time for tutorial session for each dyadic pair were also furnished. A training session was conducted by the investigator for the tutors only. In this session, the following points were discussed: (1) an outline of the Grade 2 and Grade 3 mathematics curriculum in the area of set theory; (2) an outline of objectives and test items criterion-referenced to measure the achievement of these objectives in mathematics. (Such outlines are now available from many sources. One such source is the Instructional Objectives Exchange, Los Angeles, California); (3) tutoring methods, namely diagnosis, demonstration, evaluation and practice. It was emphasized to them that a skillful tutor comes to his task with a set of learning objectives and a set of plans for reaching them. However, at each step he should adapt to the learner, timing his requests variably, rephrasing his explanations, prompting when necessary, and occasionally rejecting a plan altogether in favor of a fresh approach to a problem; (4) methods for reinforcing productive behavior, especially providing specific verbal praise tied closely to a specific aspect of the student's performance; (5) a guide for keeping a log of one's work,

lesson planning, maintaining a record and evaluating one's experiences. Tutors were told that a paraprofessional would help them in recording in the log book; (6) characteristics of children in grades 2 and 3 who were participating in the program. Peer tutors were also encouraged to discuss with their charges such topics as effective study habits, how to take tests, how to get information, how to communicate effectively, the importance of manners and appearance, the idea of success and the factors that lead to success of a person.

A typical tutorial session consisted of four steps: (1) the tutor was assigned content area to be covered on a particular day and was also furnished the objective of the content to be taught and 4 test items criterion-referenced to measure the objective; (2) the tutor was told to come prepared not only with the understanding of the content by answering those four test items but also with a set of plans for tutoring the content to the tutee; (3) it was further emphasized to him that, at each step, he must adapt to the tutee, timing his request variably, rephrasing his explanations, prompting when necessary, and occasionally rejecting a plan altogether in favor of a fresh approach to a problem; (4) to achieve mastery over the content and realize the objective the tutor was advised to consult books in the library, take his teachers help, take help from senior students, and even consult the investigator. Thus the tutor was fully prepared before getting into a one-to-one learning teaching situation with the tutee. Then, in the tutorial session, the tutor would present one of the test items to the tutee to see if the tutee could perform the task. Once

the tutee's attention had been gained and a response requested, the tutor's behavior depended upon three possibilities. First, when the tutee asked a question requesting a clarification of an instruction or permission to handle materials, the question was answered by the tutor but if the answer to the question might prompt a right or wrong response, the tutor postponed the answer and reiterated his own request. Second, when the tutee failed to respond, the tutor attempted to help the tutee understand what was being asked of him. Third, when the tutee responded to the item, the tutor classified it as correct, incorrect, or possibly unclear. Before concluding that the tutee was incapable of performing the task, the tutor made sure that the response was not prompted or cued; that the tutee did not fail to hear instructions; that the tutee was not doing a different task and that the tutee was attentive. Having decided that the tutee was not capable of performing the task set, the tutor proceeded to help the tutee. If the response appeared to be correct, the tutor made a similar series of decisions before deciding the tutee was competent at the task. In such a case, the tutee was given those items as a practice exercise. If the response did not appear to be clear, the tutor elicited a new response from the tutee.

In helping the tutee, the tutor developed the tutee's understanding of concepts and processes in which the tutee was found to be weak. Various demonstration techniques like diagrams, number lines, concrete materials, pictures, and verbal reasoning were used for this purpose. After having helped the tutee develop his understanding of the mathematical concept or process in the demonstration phase, the

tutor assigned another test item to the tutee to solve and observed his work and, in many cases, asked the tutee to explain his problem-solving or computational procedure. If the tutee could solve the example without the tutor's assistance, he was verbally praised for his accomplishment and the remaining two items were assigned to the tutee so that he could consolidate his learning. On the other hand, if the tutee experienced too much difficulty on the evaluation example, the tutor spent more time in demonstrating the concept or process. At times, the pair did not get involved in cognitive learning and just discussed study habits, test wiseness, information search, communication, manners, appearance and success factors. The tutorial program was carried out for eight months in the pilot study and for three months in the main study and the subjects involved in the experimental and control groups were again administered the tests.

Results

1. Pilot Study. The statements of 4 teachers involved, 12 children, and the principal were obtained regarding the effectiveness of peer-tutoring in the pilot study. From this informal non-test based evidence, it was found that 11 students out of 12 liked the program and thought that they had gained much from the program; teachers found the students responsible, motivated and in a better position to evaluate the results of their own behavior in the classroom. The principal of the school felt that the program was "very successful." As the results of the pilot study were very encouraging, the main study was undertaken in another school in which a larger sample of children and teachers was available.

2. Main Study. Evaluation of the effectiveness of peer tutoring in the main study was done by gathering two types of evidence: (1) informal nontest-based evidence, and (2) formal test evidence.

Informal Nontest-based Evidence. It was felt that the reactions of teachers, parents, students, and other school personnel merit reporting in that they might provide the basis for designing more meaningful and useful programs in peer tutoring.

1. Teacher Reaction. There were 19 teachers whose children were involved in the program. These teachers were asked to give their reactions to the program. For this purpose, a questionnaire was sent to each one of them. Their reactions were as follows: 19 felt that the child enjoyed the program; 17 said that there was no part of the program to which the child objected; 17 were satisfied with the program; 16 felt that the child had benefitted from the program; and 15 recommended the continuation of the program next fall. Some reactions were:

> The child follows directions and listens; he appears to be more interested in mathematics; the child feels more self-confident, knowing that she can help someone; both boys accepted responsibility in other areas of school life; it gave him a feeling of dignity; the child liked her helper; became more familiar with mathematics; seems much more motivated now; there is an improvement in child's self-concept; attitude more positive in classroom and aggressive behavior problems alleviated; the child seems to have developed a sense of responsibility or personal worth.

Some of the teachers even suggested that more children should be involved in the program. The negative reactions of four teachers were based on the disruption the tutoring program created in their schedules.

2. Parent Reactions. Thirty parents out of 32 returned the questionnaire giving their reactions to the program. Analysis of their responses showed that 28 parents were informed about the program by their child; 30 parents felt that their children enjoyed the program and that there was no part of the program to which they objected; 29 parents were satisfied with the program and 30 felt that their children benefitted from the program; 28 parents noted that they would recommend the continuation of the program next fall. Some other reactions were:

> The program helped him to understand better; he learned about math concepts he was unfamiliar with; he has enjoyed working in this program. Would it be possible to make this type of situation available to more students? It is easier for him to grasp number facts since he started the program; I would like to say that my son seems to enjoy and grasp problems easier with children helping him. I think this is a good program; more interested in mathematics; in teaching someone, he learned more himself; it seems a fine program; he learned many things in this program; program seems to be excellent as is; it helped in that his attitude has improved; it has helped him to feel responsibility and see things from a teacher's point of view; it helped her find areas where she needed to review; he understands his math better; it should be continued over a longer period of time and may be over more subjects; I really think this is an excellent idea.

From these reactions, comments and suggestions of the parents of children involved in the program, it was evident that they expressed trust, understanding and full support for the program and strongly felt that not only the program be continued next year but also the program be made available to more children covering other content areas. Two parents suggested that the program needed more specific organization to avoid conflicting situations.

3. Student Reactions. There were 32 students in the experimental group. Students were asked to answer three questions: (1) Do you like

the program? (2) Would you like to continue the program next fall? and (3) Did you benefit from the program? It was found that there was not a single student who did not respond by answering 'yes' to all the three questions. Thus they were unanimously favorable to the program.

4. Other Reactions. Two other school personnel who were actively involved were also asked to give their reactions. The Director of Elementary Education said:

> I strongly recommend that this approach continue because it is a "positive" one and indeed helps children. Not only have their math skills improved, but it seems these students are enjoying their role of tutor and tutee immensely. Children in the project will have an excellent opportunity to improve their self-image as they are experiencing success.

The other person is the paraprofessional who had helped the children in recording their experiences in the log book, making available to them lists of test items, objectives and content category, and keeping records of their attendance. She said:

> The experimental program with some of the children in our school has been most successful as far as building self-confidence and a sense of accomplishment. The older children, who were the tutors, really seemed to show a feeling of worth and maturity in their "work." The younger students, or tutees, seemed very happy to be singled out as "special" pupils. The majority took the program seriously and seemed to enjoy participating in it.

Formal Test Evidence. Though the informal evidence collected from parents, teachers, students and other school personnel strongly supported the program, test data was collected to see the effect of learning experiences provided by it on achievement, motivation levels, attitude and self-concept of children. The design of the study consisted of assigning subjects to the control and experimental groups at random and pre- and

post-testing them on the variables under study. The data were analyzed using Multivariate Analysis of Covariance with the effect of 6 pre-test scores eliminated. The scores were: IQ, Pre-math, Pre-motivation level as assessed by the teacher, Pre-motivational level as assessed by the child, Pre-attitude and Pre-self-concept. The five dependent variables were: Post-math score, Post-motivation level as assessed by the teacher, Post-motivation level as assessed by the child, Post-attitude towards the school and Post-self-concept. Two different levels of the instruments were used for older students and younger students to measure these covariates and dependent variables. Separate analyses were performed for tutors and tutees.

Multivariate Analysis of Covariance (Tutors). Table 1 (Appendix 1) gives the summary of analysis of data on five dependent variables collected on tutors and their counterparts in the control group. Though the assignment of subjects to the experimental and control groups was randomized, analysis of covariance (with 6 pre-test scores as covariates) was used to further account for individual differences among subjects. Such a step, it was hoped, will give a fair test of the experimental effect (Bock and Haggard, 1968). Table 1 (Appendix 1) shows the univariate and multivariate F-ratios with their respective probabilities. Error terms for analysis of covariance are given in Table 2 (Appendix 1).

In order to test the null hypothesis of equality of means between experimental and control groups of tutors for all the five variables simultaneously, a multivariate F-test was used to obtain a single probability statement applicable to all variables jointly. The F-ratio for the multivariate test ($F = 43.0059$; $df = 5, 21$; $p < .0001$) demonstrates significant departure from the null hypothesis. Thus, it was concluded that the tutors were favorably affected as reflected by five variables as a result of their tutoring experience.

Using a univariate F-test on each variable separately, it is found that the observed mean difference between experimental and control groups of tutors are statistically significant for mathematics ($p < .0001$), motivation as assessed by the teacher ($p < .0011$), and attitude ($p < .0500$) at the .05 level. Though the observed mean difference between experimental and control groups of tutors is not statistically significant for motivation as assessed by tutors themselves ($p < .1395$), it is noted that the difference is in the predicted direction. However, no difference is observed for the self-concept. Thus it was found that the opportunity to tutor younger unmotivated students had a favorable effect for the tutors on mathematics achievement, motivation and attitude. No such effect was indicated on the self-concept of the tutors.

The mean post-test scores of the control and the experimental groups of tutors on each of the dependent variables were further estimated and are shown in Table 1 below.

Table 1

Means and F-test Between the Post-test Scores of Control and Experimental Tutors

Variable	Control Group Means	Experimental Group Means	F	P
Mathematics	16.76	31.00	163.6362	.0001*
Motivation (T)[1]	35.88	43.69	13.8117	.0011*
Motivation (S)[2]	48.17	51.81	2.3296	.1395
Attitude	44.76	54.19	4.2373	.0502*
Self-Concept	49.71	54.75	.0023	.9618

*Significant at .05 level.
1 stands for motivation as assessed by the teacher
2 stands for motivation as assessed by the student

It can be seen from Table 1 that the differences between the mean post-test scores on mathematics, motivation as assessed by teacher, and attitude are significantly different. It is also found that the differences between mean scores on motivation as assessed by students themselves, though not significant, are in the predicted direction. Therefore, it must be concluded that the opportunity to tutor younger unmotivated students had a favorable effect on tutors.

Multivariate Analysis of Covariance (Tutees). Table 3 (Appendix 1) gives the summary of analysis of data on five dependent variables collected on tutees and their counterparts in the control group. As stated earlier, analysis of covariance was used to account for the effect of individual differences among subjects on the dependent variables. This has been suggested to be a safe strategy to adopt even though the assignment of subjects to experimental and control groups has been randomized (Bock and Haggard, 1968). Table 3 (Appendix 1) shows the univariate and multivariate F-ratios with respective probabilities. Error terms for analysis of covariance are given in Table 4 (Appendix 1).

In order to test the null hypothesis of equality of means between experimental and control groups of tutees for all the five variables simultaneously, a multivariate F-test was used to obtain a single probability statement applicable to all variables jointly. The F-ratio for the multivariate test ($F = 18.0201$; $df = 5, 18$; $p < .0001$) demonstrates significant departure from the null hypothesis. Thus, it was concluded that the tutees were favorably affected as reflected by the five variables as a result of their tutorial experience.

Using a univariate F-test on each variable separately, it is found that the observed mean differences between experimental and control groups of tutees are statistically significant for mathematics ($p < .0001$) and motivation as assessed by students themselves ($p < .0322$) at the .05 level. Though the observed mean difference between experimental and control groups of tutees is not statistically significant for motivation as assessed by teachers ($p < .2395$), it is noted that the difference is in the expected direction. However, no statistically significant difference is observed for the attitude and the self-concept. Thus, it was found that the opportunity to get tutorial help from older students had a favorable effect for the tutees on mathematics achievement, motivation as assessed by themselves and motivation as assessed by their teachers. No such effect was indicated on the attitudes and self-concept of the tutees.

The mean post-test scores of the control and the experimental group of tutees on each of the five dependent variables are shown in Table 2 below.

Table 2

Means and F-test Between the Post-test Scores of Control and Experimental Tutees

Variable	Control Group Means	Experimental Group Means	F	P
Mathematics	7.79	24.44	85.7570	.0001*
Motivation (T)[1]	38.86	41.38	1.4619	.2395
Motivation (S)[2]	43.79	47.69	5.2312	.0322*
Attitude	20.07	18.50	.1067	.7471
Self-Concept	23.85	24.06	.0377	.8480

*Significant at .05 level.
1 stands for motivation as assessed by the teacher
2 stands for motivation as assessed by the student

It can be seen from Table 2 that the differences between the post-test scores on mathematics, and motivation as assessed by students themselves are significantly different. Though the observed mean difference between experimental and control groups of tutees is not statistically significant for motivation as assessed by teachers, the difference is in the predicted direction. Therefore, it must be concluded that the opportunity to get tutorial help from student tutors has a favorable effect on the tutees.

Discussion

As stated earlier, the investigator felt that the project had a good start because the teachers were willing to do this and the Director of Elementary Education appeared dedicated and willing to give the extra time and effort it takes to make a new program work. The informal nontest-based evidence gathered from teachers and other school personnel involved in the program clearly indicated that the program was enthusiastically accepted. In fact, 80 percent recommended the continuation of the program next fall. How parents viewed the program was important to its evaluation. Parents strongly favored the program and their comments quite positively indicated that their children benefitted. Comments such as: "...an excellent program" "...should be continued over a longer period of time and over more subjects" clearly reflected the parents' positive attitude, trust, understanding and full support of the program. The major concern of the parents was that the program should be so organized that the children participating in it should not be missing any other activity. As expected, students' reactions were all positive. They expressed their desire to be involved in the program next fall. In summary, then, teachers were satisfied and noted their students renewed interest in academic

activities and in school; the students' responses were positive and the enthusiasm of students was passed along to parents.

The investigator, in gathering these reactions, tried to encourage candor to avoid collecting "happiness data." Still, it was felt that these sources needed to be supplemented. Analyzing the data on five dependent variables it was found that the tutors in the experimental group evidenced significant growth on measures of mathematics achievement, motivation as assessed by teachers, motivation as assessed by students themselves and attitude toward school. The tutees in the experimental group also showed significant growth on measures of mathematics achievement, motivation as assessed by students themselves and that motivation as assessed by teachers, though not statistically significant, was in the predicted direction.

The evaluation, therefore, indicated that the program was successful in meeting the following objectives: (1) there was significant growth in mathematics achievement for both tutors and tutees who were involved in the program; (2) there was a favorable increase in motivation level of both tutors and tutees as perceived by students themselves and inferred by teachers from these students' classroom behavior; (3) there was a favorable attitudinal change in tutors but no such change was evidenced in tutees. The only two objectives of the program which were not met were that of a favorable change in the self-concept of both the tutors and the tutees and a positive attitudinal change in tutees.

Self-concept is learned behavior. An individual's concept of self is, in part, learned on the basis of feedback he receives from significant others in his life - parents, peers, and teachers. Teachers are an especially significant source of feedback information that becomes the basis of a young person's development of concept of self. Therefore, to insure

that teachers are instrumental in providing feedback, it is felt that there is a need for closer working with teachers, teacher aides and parents so that whatever little is gained in this dimension is not lost by them by providing stuff out of which negative concepts are made. Another factor that should be taken into consideration in explaining no significant change in self-concept is the fact that though self-concept is not fixed, it does not change much, except over extended periods of time. And as the project lasted for less than three months, not enough time was available to make any appreciable impact upon students' self-concept. It is, therefore, possible that given an extended period of time, the peer tutoring procedures explored in this study may show a change not only in the directional aspect of the self-concept but also a tendency toward a stronger and more clearly articulated image of self.

The experience and feedback gained from the pilot and the main study sharply delineated the treatment to be provided to the tutors to insure an effective tutoring interaction. All those techniques which were found to be effective from the initial planning to the overall implementation of the program will be analyzed and made available in the form of a Teacher Manual. The purpose of this manual will be to help teachers become more effective in organizing peer tutoring and teaching effective tutoring style and skills to their students. The manual will also pinpoint the major source of problems and suggest feasible solutions which will allow the teachers actually to realize the objectives when the peer tutoring procedures are implemented in their schools.

Suggestions for Implementation and Further Research

Most of life's losers start young. Often they first fail in school. One failure breeds others until failure becomes their life style. The evaluation of the present study has clearly indicated that one-to-one tutorial interaction favorably affects each individual's fabric of knowledge, motivation, and attitude. As both consumers (students, parents) and practitioners (teachers, administrators) have indicated their trust, understanding and full support of the program, it is suggested that the school system should not remain ponderous and unresponsive to the positive reactions of the above groups. The school administration must marshal necessary leadership to become the source of the change.

In the implementation of any program, one is likely to encounter problems. In the school setting, some of the sources of problems are: lack of money, teachers, parents, students, non-availability of appropriate instructional materials, and the attitude of the school board. The investigator was sensitive to these problems and would like to report the problems he encountered. The evaluation of the project clearly demonstrated that teachers, parents and students did not cause any problem. In fact they were very supportive of the program. However, as the program places additional demands upon teachers, it is suggested that many teachers should be provided with sufficient training and support to cope with the transition from a teacher-directed to a self-directed instructional program. The major source of problems was the nonavailability of instructional materials that are appropriate for use in self-instructional situations. Different kinds of materials, books, pamphlets, filmstrips, overlays and records are needed. It is suggested that teachers in each area should be provided

incentives to develop materials. The school library should also be equipped with enough materials of this kind. Other problems related to the non-availability of a suitable instructional center and the services of a paraprofessional to help children involved in the program.

On the basis of the experiences derived in the present project, the Teacher Education Research Center plans to develop a Teacher Manual. The purpose of this manual will be to document procedures to be followed by teachers in other schools in order to adopt the approach taken in this project. This will include procedures for:

1. Initiating a program;
2. Selecting peer tutors;
3. Training tutors in effective tutoring style and skills;
4. Preparing instructional materials
5. Supervising tutorial sessions;
6. Assessing the whole process.

Since every innovative program places additional demands upon teachers, the Center will make available a limited number of pre-service and inservice training sessions for teachers so as to make them familiar with and capable of utilizing the peer tutoring techniques and materials in their classrooms.

Suggestions for Further Research

While care was taken to control many contaminating factors, the results may well have been contaminated by other unmeasured variables. It is, therefore, suggested that the study be replicated in several schools (1) to provide a broader basis for generalizability; (2) to systematically observe and record what goes on in the groups to study how the dyads functioned; (3) to integrate the data so gathered with research knowledge of small groups

and dyadic relationships. It is further suggested that studies should be carried out to:

(1) identify specific factors that influence student engagement in one-to-one learning situations

(2) collect test-based evidence to supplement anecdotal and testimonial evidence to support the belief that peer tutoring procedures are essential for achieving objectives related to the learner's self-concept, motivation toward learning, and attitude toward school

(3) identify specific factors that influence teachers in rejecting peer tutoring precedures

(4) determine training needs of teachers for the effective implementation of the program

(5) compare peer-tutoring procedures with traditional group-oriented procedures

(6) identify ways in which tutees reward tutors

(7) determine the training needs of tutors for the effective implementation of the program

(8) compare the relative influence of teacher, peer, school structure environment on the unmotivated children

(9) study whether age is related to ability to respond to the program and

(10) study whether sex is related to ability to respond to the program.

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Appendix I

Table 1

Summary of Analysis

Variable	MS Effect	F	P
Mathematics	1457.0511	163.6362	.0001
Motivation (T)	406.6543	13.8117	.0011
Motivation (S)	47.7980	2.3296	.1395
Attitude	339.5892	4.2373	.0502
Self-Concept	.1377	.0023	.9618

Degree of freedom for hypothesis = 1
Degree of freedom for error = 25
Six covariates have been eliminated
Multivariate F = 43.0059 with df(5, 21)
and P Less Than .0001.

Table 2

Error Term for Analysis of Covariance (within cells)

Variable	Variance (MS error)	Standard Deviation
Mathematics	8.904212	2.9840
Motivation (T)	29.442731	5.4261
Motivation (S)	20.517715	4.5296
Attitude	80.142097	8.9522
Self-Concept	58.757134	7.6653

Table 3

Summary of Analysis

Variable	MS Effect	F	P
Mathematics	1814.4970	85.7570	.0001
Motivation (T)	52.8295	1.4619	.2395
Motivation (S)	132.1413	5.2312	.0322
Attitude	2.7193	.1067	.7471
Self-Concept	.7089	.0377	.8480

Degrees of freedom for hypothesis = 1
Degrees of freedom for error = 22
Six covariates have been eliminated
Multivariate F - 18.0201 with df(5, 18)
and P Less Than .0001.

Table 4

Error Term for Analysis of Covariance (within cells)

Variable	Variance (MS error)	Standard Deviation
Mathematics	21.158578	4.5998
Motivation (T)	36.137778	6.0115
Motivation (S)	25.260404	5.0260
Attitude	25.496250	5.0494
Self-Concept	18.823409	4.3386

Appendix II

Teacher Assessment Sheet of
Positive Terminal Behaviors

Name _____ Sex _____ Age _____

Date _____ Grade_____ School _____

	Seldom	Some-times	Most Times
1. Listens to the teacher.			
2. Begins school work promptly.			
3. Corrects mistakes.			
4. Works until the job is finished.			
5. Works when the teacher has left the room.			
6. If mistakes are made, still continues to work.			
7. Arrives at class on time.			
8. Works on learning activities in free time.			
9. Does extra school work.			
10. Participates in class projects.			
11. Reads during free time.			
12. Asks questions about school work.			
13. Has pencil and paper ready when it is needed.			
14. Moves quietly to and from my classes.			
15. Listens to the ideas of others.			
16. Helps classmates with their problems.			
17. Picks up when the work is finished.			
18. Takes good care of his clothing, books, and other things.			
19. Takes good care of the school's books, desks, and other things.			
20. Does what the teacher asks.			

APPENDIX III

Self-Assessment Sheet of
Positive Terminal Behaviors

Name _____ Sex _____ Age _____

Date _____ Grade _____ School _____

	Seldom	Some-times	Most Times
1. I listen to the teacher			
2. I begin school work promptly.			
3. I correct mistakes.			
4. I work until the job is finished.			
5. I work when the teacher has left the room.			
6. If I make mistakes, I still continue to work.			
7. I arrive at class on time.			
8. I work on learning activities in free time.			
9. I do extra school work.			
10. I participate in class projects.			
11. I read during free time.			
12. I ask questions about school work.			
13. I have pencil and paper ready when it is needed.			
14. I move quietly to and from my classes.			
15. I listen to the ideas of others.			
16. I help my classmates with their problems.			
17. I pick up when the work is finished.			
18. I take good care of my clothing, books and other things.			
19. I take good care of the school's books, desks, and other things.			
20. I do what the teacher asks me.			

APPENDIX IV

School Sentiment Index
(Primary Level)

Name _____ Sex ____ Age _____

Date _____ Grade ____ School _____

	Yes	No
1. Is your teacher interested in the things you do at home?		
2. When you are trying to do your school work, do the other children bother you?		
3. Does your teacher give you work that is too hard?		
4. Do you like to tell stories in front of your class?		
5. Do other children get you into trouble at school?		
6. Is school a happy place for you to be?		
7. Do you often get sick at school?		
8. Does your teacher give you enough time to finish your work?		
9. Is your school principal friendly toward the children?		
10. Do you like to read in school?		
11. When you don't understand something, are you afraid to ask your teacher a question?		
12. Are the other children in your class friendly toward you?		
13. Are you scared to go to the office at school?		
14. Do you like to paint pictures at school?		
15. Do you like to stay home from school?		
16. Do you like to write stories in school?		
17. Do you like school better than your friends do?		
18. Does your teacher help you with your work when you need help?		
19. Do you like arithmetic problems at school?		

	Yes	No
20. Do you wish you were in a different class at school?		
21. Do you like to learn about science?		
22. Do you like to sing songs with your class?		
23. Does your school have too many rules?		
24. Do you always have to do what the other children want to do?		
25. Do you like the other children in your class?		
26. Are you always in a hurry to get to school?		
27. Does your teacher like some children better than others?		
28. Do other people at school really care about you?		
29. Does your teacher yell at the children too much?		
30. Do you like to come to school every day?		

APPENDIX V

School Sentiment Index
(Intermediate Level)

Name _____ Sex _____ Age _____

Date _____ Grade _____ School _____

	True	Untrue
1. Other children bother me when I'm trying to do my school work.		
2. My teacher always tells me when she is pleased with my work.		
3. My teacher is interested in the things I do outside of school.		
4. Each morning I look forward to coming to school.		
5. This school is like a jail.		
6. In our class, we often get a chance to make decisions together.		
7. I often feel rushed and nervous in school.		
8. My teacher gives me work that is too hard.		
9. Other children often get me into trouble at school.		
10. My teacher seldom tells me whether my work is good or bad.		
11. My teacher listens to what I have to say.		
12. It is hard for me to stay happy at school.		
13. I follow the rules at school.		
14. There are many different activities at school from which I can choose what I would like to do.		
15. When I do something wrong at school, I know I will get a second chance.		
16. My teacher gives me work that is too easy.		
17. I often must do what my friends want me to do.		
18. My teacher tries to make school interesting to me.		
19. I try to do my best in school.		
20. My teacher does not care about me.		

	True	Untrue
21. School gives me a stomachache.		
22. The principal of my school is friendly toward the children.		
23. I get as many chances as other children to do special jobs in my classroom.		
24. My teacher does not give me enough time to finish my work.		
25. The other children in my class are not friendly toward me.		
26. In school I have to remember too many facts.		
27. I like to do schoolwork at home in the evenings.		
28. My teacher doesn't understand me.		
29. I often get headaches at school.		
30. The principal's main job is to punish children.		
31. My teacher treats me fairly.		
32. My teacher makes sure I always understand what she wants me to do.		
33. I really like working with the other children in my class.		
34. I would rather learn a new game than play one I already know.		
35. I'm afraid to tell my teacher when I don't understand something.		
36. I feel good when I'm at school.		
37. I get scared when I have to go to the office at school.		
38. My teacher unfairly punishes the whole class.		
39. I get tired of hearing my teacher talk all the time.		
40. School is a good place for making friends.		
41. I wish my class could have this teacher next year.		
42. I like trying to work difficult puzzles.		
43. My teacher scares me.		
44. I like to stay home from school.		
45. When I have a problem on the playground at recess, I know I can find a nice teacher to help me.		

	True	Untrue
46. I don't like most of the children in my class.		
47. My teacher is not very friendly with the children.		
48. The biggest reason I come to school is to learn.		
49. My teacher is mean.		
50. I am embarrassed to be in the class I'm in.		
51. My teacher grades me fairly.		
52. I think a new child could make friends easily in my class.		
53. I feel like my teacher doesn't like me when I do something wrong.		
54. There are too many children in my class.		
55. When a new child comes into our class, my friends and I try very hard to make him or her feel happy.		
56. My teacher likes some children better than others.		
57. I feel unhappy if I don't learn something new in school each day.		
58. When I do something wrong, my teacher corrects me without hurting my feelings.		
59. I like school better than my friends do.		
60. I have to share books with other children too often in school.		
61. I know what my teacher expects of me.		
62. My teacher is often too busy to help me when I need help.		
63. I want to be a very good student.		
64. My teacher does not scare the children.		
65. I often feel lost at school.		
66. My teacher usually explains things too slowly.		
67. There is no privacy at school.		

	True	Untrue
68. Older children often boss my friends and me around at my school.		
69. At school other people really care about me.		
70. I would rather get books for my birthday than toys or clothes.		
71. I would rather eat lunch at home than at school.		
72. My teacher bosses the children around.		
73. The children in my class nearly always obey the teacher.		
74. We change from one subject to another too often in my class.		
75. I like my teacher.		

APPENDIX VI

Self Appraisal Inventory
(Primary Level)

Name _____ Sex _____ Age _____

Date _____ Grade _____ School _____

	Yes	No
1. Are you easy to like?		
2. Do you often get in trouble at home?		
3. Can you give a good talk in front of your class?		
4. Do you wish you were younger?		
5. Do you usually let other children have their way?		
6. Are you an important person to your family?		
7. Do you often feel bad in school?		
8. Do you like being just what you are?		
9. Do you have enough friends?		
10. Does your family want too much of you?		
11. Are you a good reader?		
12. Do you wish you were a different child?		
13. Are other children often mean to you?		
14. Do you tell your family when you are mad at them?		
15. Do you often want to give up in school?		
16. Can you wait your turn easily?		
17. Do your friends usually do what you say?		
18. Are there times when you would like to run away from home?		
19. Are you good in your school work?		

	Yes	No
20. Do you often break your promises?		
21. Do most children have fewer friends than you?		
22. Are you a good child?		
23. Are most children better liked than you?		
24. Would you like to stay home instead of going to school?		
25. Are you one of the last to be chosen for games?		
26. Are the things you do at school very easy for you?		
27. Do you like being you?		
28. Can you get good grades if you want to?		
29. Do you forget most of what you learn?		
30. Do you feel lonely very often?		
31. If you have something to say, do you usually say it?		
32. Do you get upset easily at home?		
33. Do you often feel ashamed of yourself?		
34. Do you like the teacher to ask you questions in front of the other children?		
35. Do the other children in the class think you are a good worker?		
36. Does being with other children bother you?		
37. Are you hard to be friends with?		
38. Would you rather play with friends who are younger than you?		
39. Do you find it hard to talk to your class?		
40. Are most children able to finish their school work more quickly than you?		

APPENDIX VII

Self Appraisal Inventory
(Intermediate Level)

Name _____ Sex _____ Age _____

Date _____ Grade _____ School _____

	True	Untrue
1. I like to meet new people.		
2. I can disagree with my family.		
3. Schoolwork is fairly easy for me.		
4. I am satisfied to be just what I am.		
5. I wish I got along better with other children.		
6. I often get in trouble at home.		
7. I usually like my teachers.		
8. I am a cheerful person.		
9. Other children are often mean to me.		
10. I do my share of work at home.		
11. I often feel upset in school.		
12. I often let other kids have their way.		
13. Most children have fewer friends than I do.		
14. I can always get good grades if I want to.		
15. No one pays much attention to me at home.		
16. I can always be trusted.		
17. I am easy to like.		
18. There are times when I would like to leave home.		

	True	Untrue
19. I forget most of what I learn.		
20. I am popular with kids my own age.		
21. I am popular with girls.		
22. My family is glad when I do things with them.		
23. I often volunteer in school.		
24. I am a happy person.		
25. I am lonely very often.		
26. My family respects my ideas.		
27. I am a good student.		
28. I often do things that I'm sorry for later.		
29. Older kids do not like me.		
30. I behave badly at home.		
31. I often get discouraged in school.		
32. I wish I were younger.		
33. I am always friendly toward other people.		
34. I usually treat my family as well as I should.		
35. My teacher makes me feel I am not good enough.		
36. I always like being the way I am.		
37. Most people are much better liked than I am.		
38. I cause trouble to my family.		
39. I am slow in finishing my schoolwork.		
40. I am often unhappy.		
41. I am popular with boys.		
42. I know what is expected of me at home.		
43. I can give a good report in front of the class.		
44. I am not as nice looking as most people.		

	True	Untrue
45. I don't have many friends.		
46. I sometimes argue with my family.		
47. I am proud of my schoolwork.		
48. If I have something to say, I usually say it.		
49. I am among the last to be chosen for teams.		
50. I feel that my family always trusts me.		
51. I am a good reader.		
52. I don't worry much.		
53. It is hard for me to make friends.		
54. My family would help me in any kind of trouble.		
55. I am not doing as well in school as I would like to.		
56. I have a lot of self control.		
57. Friends usually follow my ideas.		
58. My family understands me.		
59. I find it hard to talk in front of the class.		
60. I often feel ashamed of myself.		
61. I wish I had more close friends.		
62. My family often expects too much of me.		
63. I am good in my schoolwork.		
64. I am a good person.		
65. Sometimes I am hard to be friendly with.		
66. I get upset easily at home.		
67. I like to be called on in class.		
68. I wish I were a different person.		
69. I am fun to be with.		
70. I am an important person to my family.		

APPENDIX VIII

Teacher Reactions Questionnaire

Dear Colleague:

I sincerely wish to take this opportunity to thank you for your cooperation. Your encouragement of my work with a small group of children has been a great help to me. I immensely enjoyed working with tutorial groups. Your reactions to the program would help us in evaluating the usefulness of such an experience for children. Please complete and return this form with the child. Thank you.

Sincerely,

M. Mohan

1. Does the child enjoy the program? Yes ___ No ___

2. Is there any part of the program to which the child seriously objects? Yes ___ No ___

3. If so, explain _____

_____

_____

4. Are you satisfied with the program? Yes ___ No ___

5. Do you feel the child has benefited from the program? Yes ___ No ___

6. If so, in what respect? _____

_____

_____

7. Would you recommend the continuation of the program next fall? Yes ___ No ___

8. Please give us your suggestions for improving the program _____

_____

_____

APPENDIX IX

Parent Reactions Questionnaire

FREDONIA CENTRAL SCHOOL DISTRICT
FREDONIA ELEMENTARY SCHOOLS
FREDONIA, NEW YORK 14063

Dear Parents:

Dr. Madan Mohan from the State University College at Fredonia has been working with a group of children at Wheelock School. Essentially, children were grouped into pairs - each pair consisting of an older child and a younger child. The older child was asked to come prepared and to help the younger child in mathematical skills involving concepts of set theory and number system. It was hoped that such tutoring sessions in which an older child helps the younger child would help both children in recomposing their motivation for learning. Dr. Mohan informs me that he immensely enjoyed working with your child. I would very much appreciate having your answers to the following questions. Please complete and return this form, with your child, tomorrow. Thank you.

Sincerely,

Thomas L. Barresi
Director of Elementary Education

1. Did your child inform you about the program? Yes ___ No ___

2. Does your child enjoy the program? Yes ___ No ___

3. Is there any part of the program to which your child seriously objects? Yes ___ No ___

4. If so, explain _____

_____

_____

5. Are you satisfied with the program? Yes ___ No ___

6. Do you feel your child has benefited from the program? Yes ___ No ___

7. If so, in what respect? _____

_____

_____

8. Would you recommend the continuation of the program next fall? Yes ___ No ___

9. Please give us your suggestions for improving the program. _____

_____

_____

_____

mca

Teacher 1	Teacher 2	Teacher 3	Teacher 4	Teacher 5
Operates in a narrow range of motions intensity within a lesson and over time.	Uses Acting motions to serve a pedagogical function. Uses a larger percentage of Conducting motions (Table III). Uses Self-adjusting motions in a narrow range of variance.	Uses fewer Structuring moves. Uses fewer Self-adjusting motions; uses motions in a studied way for Instructional purposes (Table IV). Uses activity in the classroom in a narrow range over time. Uses activity in a larger variance range within a lesson.	Uses motions to serve a pedagogical function. Operates in a narrow variance range in these motions he employs over time. Uses Acting motions to a greater extent than the other teachers (Table III). Uses Conducting motions to serve a pedagogical function.	Uses the largest number of physical motions (Table III). Uses a larger number of verbal moves. Operates in a wide variance range of activity in each time unit from lesson to lesson.

Figure 1. Distinctive Characteristics of Teacher Performance.